

AD-A281 062



NAVY EXPERIMENTAL DIVING UNIT

TECHNICAL REPORT NO. 11-94

TEST AND EVALUATION OF THE INTEGRATED
DIVERS VEST (UNMANNED)

LTJG TREVOR RUSH

JUNE 1994

94-20503



Reproduced From
Best Available Copy



DEPARTMENT OF THE NAVY
NAVY EXPERIMENTAL DIVING UNIT

321 BULLFINCH ROAD
PANAMA CITY, FLORIDA 32407-7015

IN REPLY REFER TO:

NAVSEA TA92-042

NAVY EXPERIMENTAL DIVING UNIT

TECHNICAL REPORT NO. 11-94

TEST AND EVALUATION OF THE INTEGRATED
DIVERS VEST (UNMANNED)

LTJG TREVOR RUSH

JUNE 1994

Submitted:

T. A. Rush
T. A. RUSH
LTJG, USN
Task Leader

Reviewed:

M. D. Magill
M. D. MAGILL
LCDR, USN
Projects Officer

Approved:

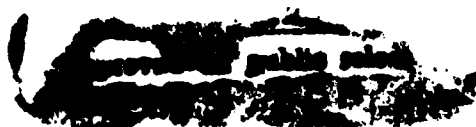
Bert Marsh
BERT MARSH
CDR, USN
Commanding Officer

B. D. McKinley
B. D. McKINLEY
LCDR, USN
Senior Projects Officer

J. R. Clarke
J. R. CLARKE, PhD
Scientific Director

M. V. Lindstrom
M. V. LINDSTROM
LCDR, USN
Executive Officer

DTIC
ELECTE
JUL 06 1994
S G D



REPORT DOCUMENTATION PAGE				
1a. REPORT SECURITY CLASSIFICATION Unclassified		1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT		
2b. DECLASSIFICATION/DOWNGRADING AUTHORITY		DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited		
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NEDU Technical Report No. 11-94		5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZ. Navy Experimental Diving Unit	6b. OFFICE SYMBOL (If Applicable) 03	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) 321 Bullfinch Road, Panama City, FL 32407-7015		7b. ADDRESS (City, State, and Zip Code)		
8a. NAME OF FUNDING SPONSORING ORGANIZATION Naval Sea Systems Command	8b. OFFICE SYMBOL (If Applicable) 00C	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code) 2531 Jefferson Davis Highway, Arlington, VA 22242-5160		10. SOURCE OF FUNDING NUMBERS		
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO. 92-042
		WORK UNIT ACCESSION NO.		
11. TITLE (Include Security Classification) (U) Test and Evaluation of the Integrated Divers Vest (Unmanned)				
12. PERSONAL AUTHOR(S) LTJG T.A. Rush				
13a. TYPE OF REPORT Test Report	13b. TIME COVERED FROM 05/94 TO 06/94	14. DATE OF REPORT (Year, Month, Day) June 1994	15. PAGE COUNT 23	
16. SUPPLEMENTARY NOTATION				
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	Integrated Divers Vest (IDV)	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) The Divers Vest, NSN 1H 4220-01-045-2194 was selected by the Navy Ships Parts Control Center, Quality Assurance Division for random testing. Twelve vests, manufactured by <u>Horse Diving Equipment Company, Inc.</u> , were submitted to the Navy Experimental Diving Unit for evaluation. Evaluation of the vests was based on the manufacturer's compliance with the requirements of MIL-V-24690(SH), MILITARY SPECIFICATION VEST INTEGRATED DIVERS. All twelve vests underwent non-destructive testing. Two vests were subjected to destructive testing. A number of discrepancies were discovered during the evaluation. The webbing used for the harness portion of the vest was the wrong type, as were the buckles used to adjust and secure the shoulder, chest, and waist straps. The ends of the webbing were not properly fused and the strap length was consistently out of specifications. The vests did not come totally assembled, and some of the items were constructed incorrectly and/or could not perform their proper function. All samples submitted for testing failed to meet the military specifications required by contract.				
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL NEDU Librarian	22b. TELEPHONE (Include Area Code) 904-230-3100	22c. OFFICE SYMBOL		

CONTENTS

	<u>Page No.</u>
INTRODUCTION	1
METHODS	1
RESULTS	1
DISCUSSION	3
CONCLUSIONS	4
 APPENDIX A - Data Collection Sheets	 A-1
APPENDIX B - <u>Columbia Research Corporation</u> Letter Report	B-1

Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification _____	
By _____	
Distribution / _____	
Availability Codes	
Dist	Avail and/or Special
A-1	

INTRODUCTION

The Navy Ships Parts Control Center (NSPCC), Quality Assurance Division, periodically conducts random testing on requisitioned material in an effort to validate asset quality. The Divers Vest, NSN 1H 4220-01-045-2194, was selected as a candidate for this program.¹ The vest is manufactured by Morse Diving Equipment Company, Inc.

Twelve units were submitted to the Navy Experimental Diving Unit for evaluation. Evaluation of the vests was based on the manufacturer's compliance with the requirements of **MIL-V-24690(SH), MILITARY SPECIFICATION VEST INTEGRATED DIVERS**. All twelve vests underwent non-destructive testing. The non-destructive testing consisted of a visual examination to check for defects in design, material, construction, workmanship, color and marking. Also the dimensions of the vests were measured and compared to the specified requirements.²

Two of the twelve vests were used for destructive testing. The destructive testing was done by Columbia Research Corporation, Gulf Coast Division located in Panama City Beach, FL. The following items were submitted to be analyzed:²

- (a) Two tank clamp screws
- (b) One brass buckle
- (c) One stainless steel buckle
- (d) The buckle and ring used to fasten the vest at the waist
- (e) One D-ring
- (f) One section of 1-3/4 inch nylon webbing
- (g) One section of 1-inch nylon webbing

METHODS

The visual examination of the vests was conducted per MIL-V-24690(SH) paragraph 4.5.1.1 and the dimensional examination was conducted per paragraph 4.5.1.2.²

The metal buckles, screws and rings submitted to Columbia Research Corporation had acid spot tests performed on them for a determination of the material from which they were constructed. One tank screw was subjected to a tensile strength test. The other screw underwent a torque test.³

RESULTS

The data collection sheets from the visual and dimensional examinations are contained in Appendix A. Appendix B holds the report from Columbia Research Corporation's testing.

Of the items that were sent out for metallurgical analysis, the tank clamp screw, D-ring, frontal closure buckle and buckle and ring assembly from the waist strap all proved to be made of the proper metal. The tank clamp screw that underwent the tensile strength test had an ultimate stress point above the minimum amount required. The torque test conducted on the second screw was unsuccessful because the screw broke into two pieces before a reading could be taken from the meter.^{2,3}

The two sections of nylon webbing were to be tested for breaking load, however there was an insufficient length to obtain results. A minimum of three feet of each type would be required for an accurate test.³ That quantity could only be obtained from a bulk load of the webbing prior to vest assembly.

Listed below are the discrepancies found during the non-destructive and destructive testing. The vests were numbered 8 - 19 so as not to be confused with previously numbered vests at NEDU.

(1) MIL-V-24690(SH) stated that the wide webbing used for the harness portion of the vest should be nylon, 1-3/4 inches wide, conforming to class I, type XIII of MIL-W-4088. The thickness of the webbing had a specified range of .080 - .120 inches. An examination with a micrometer showed that the wide webbing on all twelve vests only had a thickness of .050 inches. This would indicate the webbing is a different type than the one specified.

(2) MIL-V-24690(SH) paragraph 3.3.8 states that the buckle used to adjust and secure the shoulder, chest, and waist strap shall be made of brass. Paragraph 3.4 goes on to say that these buckles should be "rustproof". The buckles on the twelve vests do not meet these specifications. The report received from Colombia Research Corporation states that the buckles are made of steel. In the areas where the outer coating was scraped away for testing, the buckles are now visibly rusting.

(3) On each of the twelve vests, there were cases in which the wide nylon webbing was insufficiently fused at the ends. This is primarily due to the stitching that runs down the middle of the wide webbing. Improperly fused ends are listed as a defect in Table III of MIL-V-24690(SH).

(4) Table II of MIL-V-24690(SH) contained the finished measurements for the shoulder, sides, crotch, and front closure straps. The tolerance for all the measurements was plus 1/2 inch. Not one of the twelve vests met the specifications. The crotch straps were all more than one inch short. The left shoulder and right shoulder straps were never the same length, and all the shoulder straps were more than the required length; several, in fact, were in excess of two inches beyond the specifications. There were many more discrepancies in the remaining straps, and these can be seen from the data collection sheets found in Appendix A.

(5) All twelve vests were missing the elastic band loop on the left front portion of the vest used to secure the buckle assembly for the waist strap. A piece of elastic webbing was found in the general area on all the vests, however in each case it was assembled incorrectly. The elastic webbing was stitched at only one end and lay parallel with the waist strap. Instead, it should have been perpendicular to the waist strap, with one end stitched underneath so that the webbing could be passed over the waist strap and then have the second end stitched underneath, thus forming a loop used to secure the buckle. The current elastic piece can not perform the specified task.⁴

(6) A number of the vests had poorly stitched weight pockets. Loose ends of thread could be easily pulled by an examiner, causing the stitching to unravel. This is due to improper backstitching or overstitching, as well as improperly trimmed ends of thread. Both are listed as defects in Table III of MIL-V-24690(SH).

(7) On vest number 9, the tank retainer strap was not properly assembled. The nylon webbing had been twisted before it was sewn together. On vest number 13, the loop hole on the left side tank retainer strap was not big enough to fit over the metal tank clamp band. This makes the retainer strap unusable.

DISCUSSION

The results listed above show clearly that the manufacturer has not satisfied many of the specific criteria established in MIL-V-24690(SH) or the contract. Along with those discrepancies noted in the results, there were several other problems found that the military specifications do not clearly deal with.

The first is the elastic material that is used to secure straps. The material and construction fell within the appropriate mil-spec (MIL-W-5664), however, the examiners found that the ends frayed easily. In fact, in most cases, numerous threads could be pulled from the ends. It is not required to have a secured or fused end for the elastic webbing, but it is felt that such easy fraying could lead to premature wear and tear.

Next, the tank retainer strap is not big enough to hold an aluminum 80 SCUBA tank. It was designed for use only with the steel 72 tanks. This could cause increased problems in the future when dive lockers can no longer acquire the steel 72 cylinders. In conjunction with the size of the tank retainer strap, there have been complaints from the fleet concerning the material from which it is made. The 1-inch nylon is extremely thin and does not require much abrasion before it parts (i.e. from rubbing on a non-skid deck surface).

Finally, all twelve vests were delivered unassembled. Total assembly is not discussed in MIL-V-24690(SH) or the contract, however had NEDU wished to do manned testing of the vests, the two nylon pieces that make up the back of the vest

would have had to be stitched together around the tank clamp assembly. Also, a way to attach the rubber covering to the tank band would have had to be devised. The covering was supposed to be removable, but in this case there was no way to secure the covering to the tank band on any of the twelve vests.

CONCLUSIONS

Based on the visual examinations, dimensional measurements, and the testing done by Columbia Research Corporation, the Divers Vest, NSN 1H 4220-01-045-2194, fails to meet the standards set forth in the military specification, MIL-V-24690(SH) or as outlined in the contract.

REFERENCES

1. Eugene Hoey, *Letter from Commanding Officer, Navy Ships Parts Control Center (03431) to Commander, Naval Sea Systems Command. Subject: Divers Vest.* 08 March 1994.
2. *Integrated Divers Vest Test and Evaluation*, NEDU Test Plan Number 94-18, May 1994.
3. Richard Diamond, *Columbia Research Corporation Letter Report on Divers Vest Materials*, #94/50/173/ 4334, 27 May 1994.
4. *Military Specification, Vest Integrated Divers*, MIL-V-24690(SH), 28 September 1987.

APPENDIX A
DATA COLLECTION SHEETS

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: # 8

DEFECTS:

- * NYLON, CLOTH COATED- _____
- * WEBBING, BRAID AND TAPE- Elastic strap near waist buckle fraying
- * SEAM AND STITCHING- Loose stitching on backside of left front
- * HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____
- * THREAD- _____
- * COMPONENTS AND ASSEMBLY- _____
- * LABEL- _____
- * CLEANNESS- 3 thread ends not trimmed properly on left & right front

MEASUREMENTS:

LEFT SHOULDER: 20 1/2"
LEFT SIDE, TOP: 18 3/4"
RIGHT SIDE, TOP: 19"
LEFT "V": 10 3/4" 11"
CROTCH: 28 1/4"
FRONT CLOSURE, TOP: 10 7/8"
FRONT CLOSURE, BOTTOM: 7 3/8"

RIGHT SHOULDER: 19"
LEFT SIDE, BOTTOM: 19"
RIGHT SIDE, BOTTOM: 17 1/4"
RIGHT "V": 10 3/4"
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 1/2"

INSPECTOR: Yves A. Rush ENS, USN

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: #9

DEFECTS:

- * NYLON, CLOTH COATED- _____
- * WEBBING, BRAID AND TAPE- Elastic webbing at waist fraying, also at shoulder strap (left + right side)
- * SEAM AND STITCHING- Stitching, bottom middle pocket on right side in top right hand corner
- * HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____
- * THREAD- _____
- * COMPONENTS AND ASSEMBLY- Tank retainer strap not properly assembled
- * LABEL- _____
- * CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20 ³/₈"
LEFT SIDE, TOP: 18 ¹/₂"
RIGHT SIDE, TOP: 19 ¹/₄"
LEFT "V": 11"
CROTCH: 28 ⁵/₈"
FRONT CLOSURE, TOP: 10 ³/₄"
FRONT CLOSURE, BOTTOM: 7 ⁵/₈"

RIGHT SHOULDER: 18 ⁷/₈"
LEFT SIDE, BOTTOM: 19 ³/₈"
RIGHT SIDE, BOTTOM: 18"
RIGHT "V": 10 ³/₄"
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 ⁵/₈"

INSPECTOR: Yunior A. Rush, ENS, USN

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 10

DEFECTS:

- * NYLON, CLOTH COATED- _____
- * WEBBING, BRAID AND TAPE- _____
- * SEAM AND STITCHING- loose stitching on Left Front
- * HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____
- * THREAD- _____
- * COMPONENTS AND ASSEMBLY- _____
- * LABEL- _____
- * CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20 1/4
LEFT SIDE, TOP: 18 3/8
RIGHT SIDE, TOP: 18 3/4
LEFT "V": 10 5/8
CROTCH: 28 1/8
FRONT CLOSURE, TOP: 11
FRONT CLOSURE, BOTTOM: 7 1/2

RIGHT SHOULDER: 19 1/8
LEFT SIDE, BOTTOM: 18 1/2
RIGHT SIDE, BOTTOM: 17 3/4
RIGHT "V": 10 3/4
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 3/4

INSPECTOR: TASS

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: # 11

DEFECTS:

- * NYLON, CLOTH COATED- _____
- * WEBBING, BRAID AND TAPE- _____
- * SEAM AND STITCHING- Left top front pocket overstitched sloppily
- * HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____
- * THREAD- _____
- * COMPONENTS AND ASSEMBLY- _____
- * LABEL- _____
- * CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20"
LEFT SIDE, TOP: 18 1/2"
RIGHT SIDE, TOP: 18 1/2"
LEFT "V": 10 1/8"
CROTCH: 28 3/4"
FRONT CLOSURE, TOP: 11"
FRONT CLOSURE, BOTTOM: 7 1/2"

RIGHT SHOULDER: 19"
LEFT SIDE, BOTTOM: 19 1/8"
RIGHT SIDE, BOTTOM: 16 3/4"
RIGHT "V": 10 3/4"
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 3/8"

INSPECTOR

James A. Reed ENS, USN

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 12

DEFECTS:

* NYLON, CLOTH COATED- _____

* WEBBING, BRAID AND TAPE- LEFT FRONT TOP STRAP NOT FUSED PROPERLY
Crotch strap not fused properly

* SEAM AND STITCHING- right side front loose stitching on majority of
weight pockets.

* HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____

* THREAD- _____

* COMPONENTS AND ASSEMBLY- _____

* LABEL- _____

* CLEANNES- _____

MEASUREMENTS:

LEFT SHOULDER: 20 1/8
LEFT SIDE, TOP: 18 5/8
RIGHT SIDE, TOP: 18 7/8
LEFT "V": 10 7/8
CROTCH: 28 1/2
FRONT CLOSURE, TOP: 11 1/8
FRONT CLOSURE, BOTTOM: 7 5/8

RIGHT SHOULDER: 18 7/8
LEFT SIDE, BOTTOM: 19 1/4
RIGHT SIDE, BOTTOM: 17 1/2
RIGHT "V": 10 1/8
CROTCH: 7 7/8
FRONT CLOSURE, MIDDLE: _____

INSPECTOR: TASS

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 13

DEFECTS:

* NYLON, CLOTH COATED- _____

* WEBBING, BRAID AND TAPE- Left side waist strap not fused properly;
Right shoulder strap not fused properly; catch str. not
fused properly

* SEAM AND STITCHING- Left side, bottom outside pocket: bad stitching on flap;

* HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____

* THREAD- _____

* COMPONENTS AND ASSEMBLY- Tank retainer strap loop holes not big enough
to fit easily over tank clamp. Left side doesn't even fit at all!

* LABEL- _____

* CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20"
LEFT SIDE, TOP: 18 3/4"
RIGHT SIDE, TOP: 18 3/4"
LEFT "V": 10 1/2"
CROTCH: 28 3/4"
FRONT CLOSURE, TOP: 10 7/8"
FRONT CLOSURE, BOTTOM: 7 3/4"

RIGHT SHOULDER: 18 5/8"
LEFT SIDE, BOTTOM: 19 1/2"
RIGHT SIDE, BOTTOM: 17 3/4"
RIGHT "V": 10 5/8"
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 5/8"

INSPECTOR: Yusef A. Rush, ENS, USN

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 14

DEFECTS:

* NYLON, CLOTH COATED- _____

* WEBBING, BRAID AND TAPE- ALL WEBBING IMPROPERLY FUSED, PULLED APART IN THE MIDDLE.

* SEAM AND STITCHING- Loose stitching on pocket flaps

* HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____

* THREAD- _____

* COMPONENTS AND ASSEMBLY- _____

* LABEL- _____

* CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 19 7/8

LEFT SIDE, TOP: 16 7/8 18 5/8

RIGHT SIDE, TOP: 18 3/4

LEFT "V": 10 7/8

CROTCH: 28 1/2

FRONT CLOSURE, TOP: 10 7/8

FRONT CLOSURE, BOTTOM: 13 3/8

RIGHT SHOULDER: 19 1/4

LEFT SIDE, BOTTOM: 19 1/8

RIGHT SIDE, BOTTOM: 17 5/8

RIGHT "V": 10 3/4

CROTCH: _____

FRONT CLOSURE, MIDDLE: 7 1/2

INSPECTOR: TASS

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 15

DEFECTS:

* NYLON, CLOTH COATED- _____

* WEBBING, BRAID AND TAPE- Fused end, waist strap - left side; and right side; and crotch strap; and right shoulder

* SEAM AND STITCHING- Flap on pocket, left side top; right side - bottom outside pocket

* HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____

* THREAD- _____

* COMPONENTS AND ASSEMBLY- _____

* LABEL- _____

* CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20 $\frac{1}{4}$ "
LEFT SIDE, TOP: 18 $\frac{7}{8}$ "
RIGHT SIDE, TOP: 19 $\frac{1}{2}$ "
LEFT "V": 10 $\frac{3}{8}$ "
CROTCH: 28 $\frac{1}{2}$ "
FRONT CLOSURE, TOP: 10 $\frac{3}{4}$ "
FRONT CLOSURE, BOTTOM: 7 $\frac{1}{2}$ "

RIGHT SHOULDER: 19 $\frac{1}{8}$ "
LEFT SIDE, BOTTOM: 19 $\frac{1}{4}$ "
RIGHT SIDE, BOTTOM: 17 $\frac{1}{2}$ "
RIGHT "V": 10 $\frac{3}{8}$ "
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 $\frac{3}{4}$ "

INSPECTOR: Yunor A. Rush

ENS, USN

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 16

DEFECTS:

- * NYLON, CLOTH COATED- _____
- * WEBBING, BRAID AND TAPE ALL WEBBING IMPROPERLY FUSED
- * SEAM AND STITCHING- _____
- * HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____
- * THREAD- _____
- * COMPONENTS AND ASSEMBLY- _____
- * LABEL- _____
- * CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20 1/2
LEFT SIDE, TOP: 18 3/4
RIGHT SIDE, TOP: 18 3/4
LEFT "V": 10 3/4
CROTCH: 28 3/4
FRONT CLOSURE, TOP: 10 3/4
FRONT CLOSURE, BOTTOM: 2 1/2

RIGHT SHOULDER: 18 1/2
LEFT SIDE, BOTTOM: 19 1/8
RIGHT SIDE, BOTTOM: 17 3/8
RIGHT "V": 10 1/2
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 5/8

INSPECTOR: TASS

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 17

DEFECTS:

- * NYLON, CLOTH COATED- _____
- * WEBBING, BRAID AND TAPE- Inside^{and outside} webbing for neck ring - fusing bad;
left shoulder strap - fusing; right waist strap
- * SEAM AND STITCHING- Back pocket - right side
- * HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____
- * THREAD- _____
- * COMPONENTS AND ASSEMBLY- _____
- * LABEL- _____
- * CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20"
LEFT SIDE, TOP: 18 1/2"
RIGHT SIDE, TOP: 19 1/4"
LEFT "V": 10 3/4"
CROTCH: 28 1/2"
FRONT CLOSURE, TOP: 10 7/8"
FRONT CLOSURE, BOTTOM: 7 5/8"

RIGHT SHOULDER: 19 1/8"
LEFT SIDE, BOTTOM: 19 1/4"
RIGHT SIDE, BOTTOM: 17"
RIGHT "V": 10 1/2"
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 3/4"

INSPECTOR: James A. Fisher FAIS, USN

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: 18

DEFECTS:

- * NYLON, CLOTH COATED- _____
- * WEBBING, BRAID AND TAPE- splitting in middle of webbing
- * SEAM AND STITCHING- stitching loose on pockets
- * HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____
- * THREAD- _____
- * COMPONENTS AND ASSEMBLY- _____
- * LABEL- _____
- * CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20 1/8
LEFT SIDE, TOP: 18 1/8
RIGHT SIDE, TOP: 18 1/2
LEFT "V": 10 5/8
CROTCH: 28 1/2
FRONT CLOSURE, TOP: 10 3/8
FRONT CLOSURE, BOTTOM: 7 5/8

RIGHT SHOULDER: 18 3/4
LEFT SIDE, BOTTOM: 19 1/8
RIGHT SIDE, BOTTOM: 17 1/4
RIGHT "V": 10 1/2
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 3/4

INSPECTOR: TASS

DATA COLLECTION SHEET FOR VISUAL EXAMINATION
OF THE INTEGRATED DIVERS VEST

INSTRUCTIONS

1. The vest shall be examined for defects in design, material, construction, workmanship, color and marking in accordance with Table I, Annex A.
2. The vest shall be examined for conformance to the dimensions specified in Table II, Annex A. Any dimensions not meeting the specified requirements shall be classified as a defect.

SERIAL NO. OF VEST: #19

DEFECTS:

* NYLON, CLOTH COATED- _____

* WEBBING, BRAID AND TAPE- Side Straps fusing (all 4) plus both shoulders & crotch

* SEAM AND STITCHING- Left back pocket flap, left side - bottom inside pocket flap - velcro underneath;

* HARDWARE (BUCKLES, D-RINGS, RINGS, BACKPLATE) - _____

* THREAD- _____

* COMPONENTS AND ASSEMBLY- _____

* LABEL- _____

* CLEANNESS- _____

MEASUREMENTS:

LEFT SHOULDER: 20 5/8"
LEFT SIDE, TOP: 18 1/4"
RIGHT SIDE, TOP: 19"
LEFT "V": 10 1/2"
CROTCH: 20 1/4"
FRONT CLOSURE, TOP: 10 7/8"
FRONT CLOSURE, BOTTOM: 7 7/8"

RIGHT SHOULDER: 18 3/4"
LEFT SIDE, BOTTOM: 19"
RIGHT SIDE, BOTTOM: 17 1/4"
RIGHT "V": 10 5/8"
CROTCH: _____
FRONT CLOSURE, MIDDLE: 7 3/4"

INSPECTOR: James A. Rush EAS, USN

APPENDIX B

COLUMBIA RESEARCH CORPORATION REPORT



Columbia Research Corporation
Gulf Coast Division
12310 Back Beach Road
Panama City Beach, FL 32407
(904) 234-8817

May 27, 1994
94/50/173/4334

Navy Experimental Dive Unit
321 Bullfinch Road
Panama City, FL 32407-7015

Attn: LCDR Marvin Magill

REF: Contract #N0463A-94-M-0113

Dear Mr. Magill:

The results of acid spot tests conducted in accordance with CRC's AST-01 procedure are shown below.

<u>Material</u>	<u>Results</u>
One tank screw	300 Series Cres
One frontal closure buckle	300 Series Cres
One shoulder buckle	Steel
One buckle and ring assembly from waist strap	300 Series Cres
One D-ring	300 Series Cres

The tank screw submitted for torque test was destroyed during testing. It broke into two pieces prior to getting a reading on the meter. We will be happy to make another attempt at this test if you will provide another sample.

The result of the tensile test on the tank screw is shown below.

<u>Specimen</u> <u>Identification</u>	<u>Area</u> <u>(sq.in)</u>	<u>Ultimate</u> <u>Load (lbs)</u>	<u>Ultimate</u> <u>Stress (psi)</u>
Bolt	0.0318	3,200	101,000

Regretfully, we were unable to obtain test results on either of the two nylon straps submitted. A minimum of 3 feet of each of these is required for an accurate test. If you can get us a sample of these materials in a 3-foot length or greater we will repeat the test.

Sincerely,
COLUMBIA RESEARCH CORPORATION

Richards K. Diamond
Test Technician
Gulf Coast Division

RKD/ljd